CLAIMS

1. Probe (22) for measuring the resistivity of a geological formation (9) surrounding a well (10) equipped with a lining (11) conducting electricity, comprising:

a body (23) of a probe (22), that is approximately cylindrical, defining an axial direction of the probe,

a set of at least three primary voltage measurement electrodes (ea, eb, ec), two end electrodes (ea, ec), one upper electrode (ea) and one lower electrode (ec) and at least one central electrode (eb), a spacing between two consecutive electrodes (ea, eb, ec) in this set of primary electrodes in the axial direction of the body (23) of the probe (22) with an average spacing value,

two electrodes (In1, In2), an upper (In1) and a lower (In2) current injection electrodes arranged along the axial direction of the body (23) of the measurement probe (22), on each side of the set of primary electrodes,

characterized in that it also comprises,

two secondary voltage measurement electrodes (24, 26) arranged along the axial direction of the probe (22) on each side of the set of the primary electrodes (ea, eb, ec), and a first secondary electrode (24) between the two injection electrodes (In1, In2), located between the upper current injection electrode (In1) and the upper voltage measurement electrode (ea), the other being located between the lower current injection electrode (In2) and the lower end voltage measurement electrode (ec), the spacing between a secondary electrode (24, 26) and the closest primary end electrode (ea, ec) being more than 1.5 times the average spacing between the primary electrodes (ea, eb, ec).

2. Probe according to claim 1, characterized in that the primary electrodes (ea, eb, ec) and the secondary electrodes (24, 26) are formed from conducting rings implanted axially on the body (23) of the probe (22), these rings having approximately the same diameter as the body (23).

3. Probe according to one of claims 1 or 2, characterized in that the spacings between the primary electrodes (ea, eb, ec) are equal to 40 and 80 cm, the secondary electrodes being at spacings of between 240 and 560 cm.

4. Probe according to one of claims 1 or 2, characterized in that the spacings between the primary electrodes (ea, eb and ec) are about 60 cm, the secondary electrodes being at spacings of between 300 and 420 cm.

5. Process for determining an improved profile of the variation along the axial direction of the resistivity of a geological formation (9) surrounding a well (10) equipped with a lining (11) along the said axial direction, process in which a local resistivity of the formation (9) is determined by injecting the current in the lining (11) to create a leakage current in the formation measurement zone (9) and measuring the potential values at first positions (ea, eb, ec) with a spacing between consecutive positions equal to an average value, the first positions comprising at least one central position (eb) between an upper end position (ea) and a lower end position (ec) along the axial direction, and using the measurement results to calculate a local value of the leakage current in the formation (9) to determine a value of the resistivity of the said formation in the said measurement zone and then to restart the measurement by moving the first potential measurement positions along the axial direction, to deduce a first profile of the variation of the resistivity along the axial direction, process characterized in that

for each local potential measurement made in the first positions, a potential measurement at two second positions is made simultaneously on each side of the first positions, a second position being at a distance from the closest end position of more than 1.5 times the average value of the spacing between consecutive positions to deduce a second profile for the variation of the resistivity along the axial direction and then to correct the first profile by replacing resistivity values of the first profile for the first axial positions by resistivity values of the second profile when the resistivity values of the second profile at the same first axial positions are greater than the first values, the profile thus corrected forming the improved profile.

6. Process according to claim 5, characterized in that the first and second positions are displaced continuously along the axial direction, the resistivity being determined iteratively and continuously during displacement of the first and second positions, in order to obtain a continuous improved profile of the resistivity in the axial direction.